

Significant Issues and Incident Investigations

PERMAGRAIN PRODUCTS, INC.

1.0 SITE IDENTIFICATION

Location: Karthaus, PA
License No.: 37-17860-01
Docket No.: 030-13573
License Status: Active

2.0 SITE STATUS SUMMARY

The Facility is located in the Quehanna Wild Area about 45 miles northwest of State College, PA. License No. 37-17860-01 is issued to Permagrain Products, Inc. (PPI) for the operation of a Cobalt-60 irradiator.

While PPI is licensed to possess and use up to 2,000,000 curies of cobalt-60 to irradiate materials in an underwater irradiator in northcentral Pennsylvania, less than 100,000 curies are actually at the facility. The irradiator was used to cross-link a plastic monomer in wood to make a durable flooring product used in commercial and residential applications. Under NRC regulations in 10 CFR 30.35, PPI was required to have financial assurance in the amount of \$75,000. PPI had complied with the requirement by providing NRC with a \$75,000 letter of credit.

3.0 MAJOR TECHNICAL OR REGULATORY ISSUES

In response to deteriorating product demand and limits imposed on its operational line of credit, PPI declared bankruptcy in the United State Bankruptcy Court, Eastern District of Pennsylvania, on December 17, 2002. With the bankruptcy filing, the licensee had no resources to maintain or secure the facility or to dispose of the sources and decommission the facility. Region I called in the letter of credit on December 12, 2002 and coordinated with the Commonwealth of Pennsylvania to secure and maintain the facility effective the day of the bankruptcy filing. On February 14, 2003, in recognition of the Commonwealth's limited funds to continue security and maintenance at the site, Region I requested that U.S. Environmental Protection Agency (EPA) perform an emergency removal and disposal of the sources. EPA responded to the Region I letter on February 13 indicating that they were proceeding to gather information in support of implementing federal removal response activities at the site.

The sealed cobalt-60 sources possessed by PPI are old and of low specific activity. New sources are usually about 10,000 curies per source. All of the sources at PPI are less than 1000 curies and many are less than 100 curies. Therefore, they have no economic value and probably will be disposed as radioactive waste.

Current estimates are that removal and disposal of the sources will cost between \$1.5 million and \$1.9 million, amounts considerably in excess of the financial assurance provided by the licensee.

A soon-to-be-final rulemaking will require, among other things, that financial assurance for irradiators be based on an actual cost estimate rather than a fixed amount specified in the regulations. As long as the staff assures that the cost estimates for irradiators are thorough and complete (including, for example, facility security and maintenance costs) that rulemaking should prevent similar problems at other irradiators. However, the Permagrain case has highlighted the potential risk of financial assurance instruments which may underestimate the actual cost of decommissioning a facility.

FANSTEEL INC.**1.0 SITE IDENTIFICATION**

Location: Muskogee, OK
License No.: SMB-911
Docket No.: 040-07580
License Status: Expired (possession only)

2.0 SITE STATUS SUMMARY

From 1958 until 1989, Fansteel Speciality Metals operated a process to recover tantalum, niobium, scandium, and other metals of commercial value from ores and previous process waste residues. Fansteel decontaminated approximately 35 acres of the 110-acre Muskogee facility designated as the "Northwest Property," and the NRC released this area for unrestricted use. Fansteel has an NRC license dated March 25, 1997, to complete the processing of ore residues, calcium fluoride residues, and wastewater treatment residues containing uranium and thorium, in various site impoundments. In November, 2001, Fansteel notified NRC that it had ceased operating the facility. The current license expired in September, 2002; the renewal application was denied because Fansteel wrote off the cost of the facility in its bankruptcy and did not provide sufficient financial assurance.

On January 15, 2002, Fansteel and its U.S. subsidiaries filed for voluntary bankruptcy (Chapter 11) in the U.S. Bankruptcy Court for the District of Delaware; one subsidiary in Mexico and one in Barbados were not included in this action. On June 25, 2002, Fansteel submitted an assessment of financial assurance (FA) in accordance with its license. The letter provided a cost estimate and stated it could not obtain the \$57 million in financial assurance -- the cost estimate to decommission for unrestricted use filed with the bankruptcy court -- and asked NRC to defer further consideration of FA until December 22, 2002.

NRC engaged its financial assurance review contractor, ICF, to evaluate the Fansteel site and develop cost estimates for decommissioning for unrestricted use and for restricted use, as defined in Subpart E of 10 CFR 20. ICF provided a report on November 15, 2002 that showed estimated decommissioning costs from \$105 - \$230 million; the differences are in disposal costs of \$5 - \$17 per cubic foot.

Fansteel submitted its decommissioning plan (DP) on January 16, 2003. In this DP, Fansteel proposed an industrial land use scenario with the ground water pathway turned off. The estimated cost is given as \$26 million (plus \$14 million for ground water and chemical remediation for Oklahoma Dept. of Environment Quality (ODEQ); this is a significant reduction from the \$57 million estimate in the bankruptcy and the June 25 letter to NRC regarding financial assurance.

Staff has met several times with Fansteel to develop a plan for funding remediation of the Muskogee site. Fansteel has not presented a plan acceptable to the NRC staff.

3.0 MAJOR TECHNICAL OR REGULATORY ISSUES

Fansteel has provided a total of about \$4.5 million in financial assurance. The previous Fansteel estimate for decommissioning, by deposition to the Bankruptcy Court, is \$57 million for off-site disposal of all wastes greater than 10 pCi/g total rad, a license condition limit. The revised estimate of \$26 million is based on dose criteria of 10 CFR 20.1402 using an industrial land use scenario with no ground water pathway. It estimates an additional \$14 million for commitments to ODEQ, primarily ground water remediation. Because it is in a bankruptcy proceeding, Fansteel states it is not able to provide the additional assurance. The DP, except portions of Chapter 15 - financial assurance -- was received in January 16. The letter of transmittal stated that the FA portion would be submitted by February 14. Staff met with Fansteel and various counsel on December 18, February 5, and February 21 at NRC HQ. In addition, there have been several other meetings and phone calls among the relevant parties. As of 26 March, 2003, Fansteel has not provided a plan to emerge from bankruptcy and fund remediation of the Muskogee site that is acceptable to the NRC staff.

Preliminary review of the DP indicates there are short comings in the characterization, the level of detail about planned remedial activities, the final status survey, and, consequently, the cost estimate. The staff is writing a letter rejecting the DP and instructing Fansteel to provide a schedule for resubmittal. Without satisfactory site characterization and plan of activities, the final cost to remediate cannot be reasonably estimated.

Contaminants at the site include natural uranium and decay products, and natural thorium and decay products. Chemical contamination in the form of metals including tantalum, niobium, chromium, antimony, tin, barium, arsenic; ammonia fluoride and methyl isobutyl ketone are also present.

Groundwater contamination is non-uniformly distributed at the Fansteel site. Measurements taken in the shallow groundwater zone during the Spring of 1993 ranged from 19 pCi/l to 2600 pCi/l gross alpha and from 59 to 1300 pCi/l gross beta. A Spring 1993, sampling and analysis of three deep (bedrock) groundwater wells in the process area, and one in the NW property, detected no concentrations above background levels. These wells were closed shortly thereafter. Fansteel estimates \$14 million to remediate the ground water in the shallow aquifer. Soil contamination is non-uniformly distributed at the Fansteel site. Gross alpha concentrations range from 21 to 360 pCi/g; uranium concentrations range from 6.2 to 93 pCi/g; and thorium concentrations range from 7.2 to 51 pCi/g. The depth of contamination ranges from the ground surface to 7.9 m (26 ft) below, with the majority concentrated within the top 0.76 m (2.5 ft) of soil, but there is significant contamination deeper in the vicinity of the chemical processing buildings and ponds 2 and 3.

Preliminary radioactivity surveys indicate that surfaces and equipment in the following buildings are contaminated: Chemical A, Chemical C, Thermite, Sodium Reduction, and Research & Development Lab.

Fansteel estimates that the volume of contaminated soil and other material for which metal recovery operations are feasible and that must be transported off-site is 16,810 m³ (594,000 ft³). "Offsite" is defined as any other area and may include areas currently owned by Fansteel and located adjacent to the Eastern Property Area.

There is public interest about the decommissioning of this site. There are two primary parties: the State of Oklahoma and the Cherokee Nation. The State Office of the Attorney General has a representative participate in the meetings with Fansteel. ODEQ is also reviewing the DP. The Nation is interested because the Fansteel property is within its area of influence in eastern Oklahoma.

SAFETY LIGHT CORPORATION**1.0 SITE IDENTIFICATION**

Location: Bloomsburg, PA
License No.: 37-00030-02
Docket No.: 030-05980
License Status: Active

2.0 SITE STATUS SUMMARY

The Safety Light Corporation (SLC) facility is located about five miles east of Bloomsburg, Pennsylvania. SLC is licensed (37-00030-02) to perform site characterization and decommissioning activities. The SLC site is contaminated from manufacturing operations of self-luminous watch and instrument dials and other items involving Ra-226, Cs-137, Sr-90, and Am-241. The site is approximately 10 acres in size and contains about 16 buildings. Work with radioactive materials (Ra-226) began at the site in 1948. License 37-00030-08 is still active for H-3 exit sign work utilizing a full time staff of about 20 individuals.

Radioactive waste was disposed on site in three primary locations: silos, lagoons, and a waste dump. In the fall of 1999, the licensee began removal of the radioactive material from the two underground silos. This radioactive material is currently stored on site in 55 gallon drums and B-25 boxes awaiting further processing/sorting prior to disposal.

NRC staff continue to coordinate activities with Environmental Protection Agency (EPA) and Pennsylvania Department of Environmental Protection (PADEP) regarding remediation of the SLC site. An EPA Administrative Order of Consent (AOC) with SLC for the sorting, characterization, and re-packaging of the drums of mixed waste and radioactive waste that were removed from the onsite silos, became effective on February 3, 2003. On August 15, 2002, NRC amended the SLC license to approve the work plan for this activity, as did PADEP. A separate EPA Order will be prepared for disposal of the waste. If disposal costs exceed the licensee's decommissioning funds, EPA could propose a unilateral Order and use EPA emergency removal funds.

With renewal of License No. 37-00030-02 in December 1994 for a five year period, SLC entered into a settlement agreement with the NRC to place funds into a trust account and contributed \$348,000 over five years. USR Industries, a previous responsible party, contributed an additional \$48,000. The licensee also received insurance settlements in the amounts of \$1.3 million and \$500,000. These funds are for site maintenance and decommissioning. With the renewal of the license in December 1999, SLC is required to contribute to the trust account a total of \$492,000 over the five year term of the renewal.

3.0 MAJOR TECHNICAL OR REGULATORY ISSUES

A 1995 site characterization identified primary soil contaminants as Ra-226 and Cs-137 with small amounts of Am-241. The onsite ground water is also contaminated with H-3, Sr-90, and Cs-137. The 1998 site decommissioning and decontamination (D&D) report submitted to the NRC called for a "task by task" approach to decommissioning because of limited funding availability. Estimated decommissioning costs were approximately \$15 million, excluding H-3 waste.

A more recent decommissioning cost estimate (DCE), submitted in 2000, estimated the decommissioning costs at \$29 million, including the H-3 waste. Review by NRC found the DCE significantly underestimated the costs for soil removal. Staff estimates DCE for unrestricted release to be between \$94-\$120 million.

Lack of financial assurance remains the key issue; effective remediation work cannot be performed because of limited funding. The licensee is proposing that the remaining funds be used to characterize, re-package and dispose of waste that was removed from underground silos. Other decommissioning tasks have been outlined and estimated in the licensee Decommissioning Plan and DCEs that were submitted in 2001.

In December 2001, NRC requested that EPA Region 3 conduct a preliminary site assessment for the purpose of scoring the site for inclusion on the National Priorities List and possible remediation under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). EPA has completed the scoring package. When the package is sent to EPA Headquarters for review, a copy will be shared with NRC.

NRC staff submitted a claim in December 2001 against USR Industries (de jure licensee of NRC for the Bloomsburg facility) before the US Bankruptcy Court for the Southern District of Texas. However, in April and June 2002, the bankruptcy claims were dismissed by the Court, because the debtor failed to prosecute.

Coordination activities continue between NRC, EPA, and PADEP staffs to develop a path forward for this site. The last joint telephone conference was held on February 7, 2003.

SCHLUMBERGER TECHNOLOGY CORPORATION**1.0 SITE IDENTIFICATION**

Location: Sugar Land, TX
License No.: 42-00090-03
Docket No.: 030-06388
License Status: Active

2.0 SITE STATUS SUMMARY

A Region IV well-logging licensee, Schlumberger Technology Corporation (STC), notified the NRC Operations Center, on May 23, 2002, of an incident involving the loss of control of a radiation source and possible unplanned exposures of 31 oil rig workers. The source was a cesium-137 well-logging source of 44 gigabequerel (1.2 Ci) nominal activity, and the incident occurred on an oil rig in Montana during drilling operations. Region IV conducted a special inspection on May 25-26, 2002, to determine the facts of the event, interview the workers involved, and calculate preliminary dose estimates for the exposed workers.

The licensee submitted its report of the event to the NRC on June 26, 2002. In its report, the licensee estimated that the highest dose to any worker, based on time-and-motion reconstructions of the event and some conservative assumptions, was 0.064 Sv (6.4 rem). To support its bounding dose calculations, the licensee had blood tests performed on 10 of the workers involved in the event. These tests were routine blood counts done at a local hospital, and were intended to rule out high radiation exposures by showing that there were no abnormally low blood counts. The workers were advised to forward their test results to the Radiation Emergency Assistance Center/Training Site (REAC/TS) for interpretation, and six of the 10 workers who took the tests sent their blood test results.

REAC/TS did not find any indications of radiation dose based on its examination of the blood sample results for these workers. REAC/TS did recommend that one of the workers (Worker D) be advised that a cytogenetic test be done. Since REAC/TS currently does not provide cytogenetic testing, the Armed Forces Radiobiology Research Institute (AFRRI) in Bethesda conducted this test. NRC was informed of the cytogenetic test results on August 30, 2002. The results showed a radiation dose on the order of 2 Gy (200 rad) whole body equivalent. The radiation dose assessment completed by the NRC for this worker indicated that the most likely dose was less than 1 cGy (1 rad).

NRC upgraded the inspection effort to an Augmented Inspection Team (AIT) because of the significant discrepancies between the estimated radiation doses and the cytogenetic test results, and because of the potential for a high radiation dose to a member of the public.

NRC decided to repeat the cytogenetic tests for this individual and six other workers who were exposed. In addition, NRC decided to split the blood samples three ways and send these split samples to three different laboratories, one being AFRRI, and the others being the National Radiological protection Board (NRPB) in England, and the Institute for Radiation Protection (IRD) in Brazil.

The results of this second round of testing, as reported by NRPB, were negative, that is, showed zero radiation dose for all but Worker D who had the AFRRI reported dose of 2 Gy. The results from NRPB for Worker D showed a slightly elevated chromosome dicentric frequency, which corresponded to an equivalent whole-body dose in the range of 0-14 cGy (0-14 rad), with a mean of 4 cGy (4 rad). The samples sent to IRD did not pass the Brazilian customs and were not analyzed.

The cytogenetic test results from AFRRI agreed with those of NRPB for all the workers and showed no radiation dose, except for Worker D for whom AFRRI estimated a dose of 1.3-1.5 Gy (130-140 rad). The cytogenetic test slides from NRPB for Worker D were sent to IRD in Brazil for evaluation, and slides from AFRRI's second test for Worker D were sent to IRD for evaluation. Also, the slides from AFRRI's initial cytogenetic test for Worker D were sent to NRPB for evaluation.

Without discussing specifics of the cytogenetic results from the three labs, there appeared to be considerable disagreements in their results. To summarize.

- Results from IRD and NRPB are in agreement, and indicate very low to zero doses for all workers
- Results for AFRRI agreed with IRD and NRPB for all samples except for Worker D.
- Although NRPB and IRD both found very low to zero radiations doses for Worker D, AFRRI reported a radiation dose of 1 Gy (100 rad).
- Discussions between NRC and the three labs led to a probable cause for the disagreements, which involved an unusual characteristic for Worker D 's chromosomes, which resulted in some of Worker D's chromosomes, viewed under the microscope, to look like dicentrics, thus giving an erroneously high radiation dose estimate.

Based on NRC's radiation dose estimates, the most probable doses received by all of the exposed workers are in the range of 0-1 cSV (0-1 rem). Most of the radiation doses are estimated to be at or slightly above NRC's dose limit for members of the public of 0.1 cSV (0.1 rem) per year.

3.0 MAJOR TECHNICAL OR REGULATORY ISSUES

AFRRI's cytogenetic facility is the only lab in the United States that is currently available to the NRC for cytogenetic testing on an ongoing and on-demand basis for use in radiation dose assessments. Although AFRRI has been of assistance in the past, and may be able to assist NRC in the future, there are several significant considerations including:

- The turn-around time for the results, the time from delivery of a blood sample to the lab to receipt of the results of the cytogenetic test is currently at least 3 weeks per sample.
- It is unsatisfactory to have only one lab engaged in this activity, because this leaves no means of verifying the validity of the one lab's methods and results by comparison with the results of other labs on a routine, controlled, and ongoing basis, which is normal practice for any activity involving accurate measurements.

With only one laboratory in the United States currently available, this significantly limits the capability to reliably perform cytogenetic blood testing.